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(54) Recording and/or reproducing system and data backup system

(57) A recording and/or reproducing system has a recording and/or reproducing section and an interfacing unit. The recording and/or reproducing section records and/or reproduces digital data or digital signals on or from a loaded recording medium, such as a magnetic tape. The interfacing unit has a first input/output section for exchanging data and/or signals with an external equipment and a second input/output section for exchanging data and/or signals with the recording and/or reproducing section. The interfacing unit converts data and/or signals supplied from the recording/reproducing section through the second input/output section and sends the converted data and/or signals through the first input/output section to the external information equipment, while converting data and/or signals supplied through the first input/output section from the external information equipment and sending the converted data and/or signals through the second input/output section to the recording and/or reproducing section.

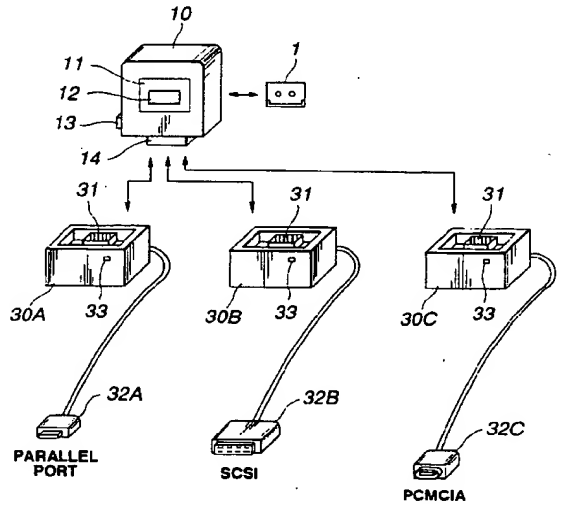

FIG.1

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BACKGROUND

1. Field of the Invention

The present invention relates to a recording and/or reproducing system and a data backup system. More particularly, the present invention relates to a recording and/or reproducing system employing a recording medium and a data backup system employing a recording medium.

2. Background of the Invention

In general, there is known a data backup system employing a data backup device called a data streamer, for example, in which data backup for a host computer is done using a magnetic tape as a recording medium.

On the other hand, standardization of IC memory cards is proceeding and IC memory cards of the credit card size, termed a PC card, conforming to the standard design statements of Personal Computer Memory Card International Association (PCMCIA), an organization for standardization of U. S. A., and Japan Electronic Industry Development Association (JEIDA), has become popularized. The market for the portable information communication equipments or personal computers having an operating system (OS) having a control function of the PC cards is being expanded rapidly.

The PC card control software, pursuant to the standard design statements of PCMCIA/JEIDA, executes the following processing operations (i) to (iv) for resource control:

(i) the operation of advising a device driver of the effect that a PC card has been introduced into a PC card slot;

(ii) the operation of reading out the attribute information of the card on request from a configuration software of a device driver;

(iii) the operation of allocating the level of interrupt, area of I/O space and memory space of a personal computer required for operations; with the operation of allocation being executed dynamically responsive to the state of utilization of the system resource of the PC card or other peripheral equipments; and

(iv) writing a value specified by the software for configuration in a register in a PC card or a PC card controller LSI.

With the conventional data backup device, since the device is bulky and consumes a significant amount of the electric power, it has been impossible to maintain the portability when the device is connected to a lap-top personal computer or a portable information communication equipment. On the other hand, it is required of a user to provide for separate software installment when a tape backup device is connected to a personal computer.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a recording and/or reproducing system which resolves the above-mentioned problems.

It is another object of the present invention to provide a data backup system which resolves the above-mentioned problems.

It is a further object of the present invention to provide a tape-shaped recording medium which resolves the above-mentioned problems.

In one aspect, the present invention provides a recording and/or reproducing system having a recording and/or reproducing section for recording and/or reproducing digital data or digital signals on or from a loaded tape-shaped recording medium, and an interfacing unit having a first input/output section for exchanging data and/or signals with an external information equipment and a second input/output section for exchanging data and/or signals with the recording and/or reproducing section. The interfacing unit converts data and/or signals supplied from the recording and/or reproducing section through the second input/output section and routes the converted data and/or signals through the first input/output section to the external information equipment. The recording and/or reproducing section also converts data and/or signals supplied from the external information equipment through the first input/output section and routes the converted data and/or signals through the second input/output section to the recording and/or reproducing section.

In another aspect, the present invention provides a data backup system having a host system having a slot and having loaded therein an operating system having a control function for controlling a personal computer card inserted into the slot for being loaded in position, and a recording and/or reproducing system having a recording and/or reproducing section and an interfacing unit. The recording and/or reproducing section records and/or reproduces digital data or digital signals on or from a tape-shaped recording medium loaded therein. The interfacing unit has a first input/output section for exchanging data and/or signals with the host system and a second input/output section for exchanging data and/or signals with the recording and/or reproducing section. The interfacing unit converts data and/or signals supplied from the recording and/or reproducing section through the second input/output section and routes the converted data and/or signals through the first input/output section to the host system. The recording and/or reproducing section also converts data and/or signals supplied from the host system through the first input/output section and routes the converted data and/or signals through the second input/output section to the

recording and/or reproducing section. Data backup of the host system is realized by the recording and/or reproducing system inserted in position in the slot in the host system.

In still another aspect, the present invention provides a recording and/or reproducing system having a recording and/or reproducing section for recording and/or reproducing digital data on or from a loaded tape-shaped recording medium. The recording and/or reproducing section has a terminal section through which data is entered to or outputted, an dan interfacing unit having a first connecting portion for connection to an external information equipment and a second connecting portion for connection to the terminal portion of the recording and/or reproducing section. The interfacing unit receiving and sends out data and/or signals supplied from the external information equipment through the first connecting portion and receives and sends out data and/or signals from or to the recording and/or reproducing section through the second connecting portion. The interfacing unit converts data and/or signals supplied from the recording and/or reproducing section through the second connecting portion and routes the converted data and/or signals through the first connecting portion to the external information equipment. The recording and/or reproducing section also converts data and/or signals supplied from the external information equipment through the first connecting portion and routes the converted data and/or signals through the second connecting portion to the recording and/or reproducing section.

In still another aspect, the present invention provides a data backup system including a host system having a slot and having loaded therein an operating system having a control function for controlling a personal computer card inserted into the slot for being loaded in position, and a recording and/or reproducing system having recording and/or reproducing section and an interfacing unit. The recording and/or reproducing section records and/or reproduces digital data or digital signals on a tape-shaped recording medium loaded therein. The interfacing unit has a first input/output section for exchanging data and/or signals with the host system and a second input/output section for exchanging data and/or signals with the recording and/or reproducing section. The interfacing unit converts data and/or signals supplied from the recording and/or reproducing section through the second input/output section and routes the converted data and/or signals through the first input/output section to the host system. The recording and/or reproducing section also converts data and/or signals supplied from the host system through the first input/output section and routes the converted data and/or signals through the second input/output section to the recording and/or reproducing section. Data backup of the host system is achieved by the recording and/or reproducing system inserted in position in the slot in the host system.

In yet another aspect, the present invention provides a tape-shaped recording medium in which digital data is recorded during forward transporting of the recording medium in plural azimuth tracks formed in one of two areas thereof divided along the longitudinal direction and in which digital data is recorded during reverse transporting of the recording medium in plural azimuth tracks formed in the other of the two areas. The recording medium has subcode data arrayed at a mid portion of each track, a plurality of control data arrayed on both sides of the subcode data, data areas arrayed on outer sides of the control data, and discrimination data recorded in the control data. The discrimination data specifies the digital data recorded in the data areas.

With the recording and/or reproducing system of the present invention, data can be recorded on or reproduced from the recording medium through an interfacing unit for an external information equipment, such as a computer. Thus the recording and/or reproducing system may be employed for enabling reliable data backup for the external information equipment even if the data is of a large volume.

On the other hand, with the tape-shaped recording medium of the present invention, suitable signal processing may be realized by discriminating types of data read out from the recording medium even if data of different sorts are recorded in a commingled state on the recording medium.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 illustrates a system configuration according to the present invention.

Figs. 2a and 2b illustrate a recording format on a tape according to the present invention.

Fig. 3 is a perspective view showing a driving unit and an interfacing unit according to a first embodiment of the present invention.

Fig. 4 is a block diagram showing the state of a system connection according to a first embodiment of the present invention.

Fig. 5 is another block diagram showing the state of a system connection according to a first embodiment of the present invention.

Fig. 6 is a further block diagram showing the state of a system connection according to a first embodiment of the present invention.

Figs. 7a and 7b illustrate a recording format.

Fig. 8 illustrates a CLT area in the recording format.

Fig. 9 illustrates a control word CW_0 of a CL area in the recording format.

Fig. 10 is a perspective view showing a driving unit and an interfacing unit according to a second embodiment.

Fig. 11 is a block diagram showing the state of a system connection according to a second embodiment of the present invention.

Fig. 12 is another block diagram showing the state of a system connection according to a first embodiment of the present invention.

Fig. 13 is a further block diagram showing the state of a system connection according to a first embodiment of the present invention.

Fig. 14 is a perspective view showing the state in which a host system and a data backup system in the data backup system in a third embodiment of the present invention are separated from each other.

Fig. 15 is a perspective view showing the state in which a data backup system is loaded on a host system in the data backup system in the third embodiment of the present invention.

Fig. 16 is a plan view showing a data backup system.

Fig. 17 is a side view showing the data backup system.

Fig. 18 is a perspective view showing the data backup system.

Fig. 19 is a block diagram showing essential portions of an electrical configuration of the data backup system.

Fig. 20 is a block diagram showing essential portions of an electrical configuration of the host system.

Fig. 21 is a plan view showing a modified embodiment of the data backup system.

Fig. 22 is a plan view showing another modified embodiment of the data backup system.

Fig. 23 is a plan view showing a further modified embodiment of the data backup system.

Fig. 24 is a perspective view showing the data backup device shown in Fig. 23.

DESCRIPTION OF THE INVENTION

Referring to Figs. 1 to 9, a first embodiment of the present invention will be explained in detail. Also, referring to Figs. 1, 2 and 7 to 13, a second embodiment of the present invention will be explained. In these embodiments, an ultra-small-sized tape cassette for digital audio is employed as a recording medium.

In this ultra-small-sized cassette of 30.0 x 21.5 x 5.0 mm^3 in size is accommodated a magnetic tape having a tape width of 2.5 mm. A rotary head is introduced through a front side opening in the tape cassette which is closed by a rotatable lid. On this magnetic tape of the ultra-small-sized tape cassette are recorded digital audio data compressed by 12-bit kinked-line compression at a sampling frequency of 32 kHz with 17 quantizing bits. The digital audio signals or digital data recorded on the magnetic tape are read out from the magnetic tape by rotating the rotary head at twice the number of revolutions. The digital audio signals or digital data read out from the magnetic tape are temporarily stored in a memory and re-arrayed on the memory in a correct sequence so as to be outputted as playback signals.

The first embodiment is directed to a configuration in which data for computer use may be recorded and/or reproduced using an ultra-small-sized tape cassette, while the second embodiment is directed to a configuration in which not only the data for computer use but also other data such as audio or video data may be recorded and/or reproduced in a state of being commingled with the data for computer use. The data for computer use means a lot of kinds of data depending on the sorts of the information equipments or the applications and may be enumerated by files, pictures, letters, programs and speech. The data for computer use or the computer use data herein signifies data exchanged with the information equipments. The other data present in a commingled state with the computer use data signifies data exchanged with audio or video equipments.

Fig. 1 shows a configuration of a recording and/or reproducing system, in which a reference numeral 1 denotes an ultra-small-sized tape cassette, as a recording medium, as previously explained, and a reference numeral 10 denotes a driving unit for recording and/or reproduction on or from the tape cassette 1. The driving unit 10 is associated with interfacing units 30A, 30B and 30C.

The interfacing units 30A, 30B and 30C are in meeting with a particular interfacing system adopted in information equipments, such as personal computers. For example, the interfacing units 30A, 30B and 30C correspond to a parallel port interface, a small computer system interface (SCSI) and to PC Memory Card International Association (PCMCIA) interface, respectively.

The drive unit 10 can be mounted on and dismounted from each of the interfacing units 30A to 30C.

That is, with the system of the present embodiment, data from the external information equipment can be recorded by the drive unit 10 on the cassette tape 1 or the data reproduced from the tape cassette 1 can be supplied to the external information equipment by connecting a connector 32A of the interfacing unit 30A to the information equipment of the parallel port interfacing system and by loading the driving unit 10 on the interfacing unit 30A, respectively.

Similarly, by employing the interfacing unit 32B for the information equipment of the SCSI system, data can be recorded from the information equipment on the tape cassette 1 and data reproduced from the tape cassette 1 can be supplied to the information equipment.

In addition, for the information equipment of the PCMCIA interfacing system, for interfacing with respect to the so-called memory card, the interfacing unit 32C is employed for recording data from the in-

formation equipment on the tape cassette 1 or the data reproduced form the tape cassette 1 can be supplied from the tape cassette 1 to the information equipment.

In these cases, signals are recorded on a tape 2 within the tape cassette 1 as shown for example in Fig. 2a. The tape cassette 1 has sides A/B and has its recording region divided into two portions along the tape width. Fig. 2a shows the state of recording various computer data supplied from the personal computer or the like. Meanwhile, the tape cassette 1 is occasionally employed in a recording apparatus for usual audio application. Fig. 2a shows that audio data recorded therein are present in a mixed state with the computer data.

Fig. 3 shows the drive unit 10 and the interfacing units 30 (30A to 30C) to an enlarged scale.

In the driving unit 10, a reference numeral 11 denotes a lid for loading/unloading the tape cassette 1. The lid 11 has a window 12 through which the user may recognize whether or not the tape cassette 1 is loaded in position in its inside. The lid 11 is opened by thrusting an ejection key 13.

A connector 14 is arranged in a lower part of the drive unit 10, as shown in Fig. 1.

The interfacing unit 30 has a connector 31 on its upper side. The connector 31 is connected to the connector 14 of the drive unit 10.

A reference numeral 32 (32A to 32C) denotes a connector (connectors) for connecting the interfacing unit 30 (30A to 30C) to external information equipments.

A reference numeral 33 denotes an LED which is turned on responsive to the recording/reproducing operation in the driving unit 10.

A battery 50 such as a size AA dry cell is loaded in the interfacing unit 30. An external DC jack may also be provided for supplying the current from a commercial AC source by a DC adapter, not shown.

Fig. 4 is a system block diagram in case the connected interfacing unit is the interfacing unit 30A.

A reference numeral 60 denotes a host computer which in this case is an equipment constructed in accordance with the parallel interfacing system.

The tape cassette is loaded on the driving unit 10 for enabling recording/reproduction. A reference numeral 15 denotes a head drum on the cylindrical peripheral surface of which is mounted a magnetic head. The head drum 15 is intruded into the casing of the tape cassette 1 as shown so as to be placed a re-set angular extent on its peripheral surface. If the head drum 15 is rotated with tape transportation or tape travel, the magnetic head on the periphery thereof traces a track on the drum in accordance with the so-called helical scan system.

Reference numerals 16, 17 and 18 denote a recording/reproducing system, an interfacing unit and a system controller, respectively.

In the interfacing unit 30A, the numeral 34A denotes a conversion control unit for interfacing between the host computer 60 and the driving unit 10.

A parallel port interface is established between the conversion control unit 34A and the host computer 60 through a connector 32A, as shown in Fig. 4.

With the driving unit 10 being loaded on the interfacing unit 30A and the connecter 14 being connected to the connector 31, exchange of data and various signals is done between the conversion control unit 34A and the interfacing unit 17 in accordance with the recording/reproducing format of the above-mentioned ultra-small-sized tape cassette.

With the above-described arrangement, the following operation is realized.

If it is desired to record data in the host computer 60 on the tape cassette 1, the interfacing unit 30A controls the recording by the driving unit 10, at the same time as it executes transmission and reception of data D_0 to D_7 and control signals from the host computer 60.

A source voltage V_D is supplied from the interfacing unit 30A to the driving unit 10.

The interfacing unit 30A also outputs a wake-up signal for starting the system controller 18.

The interfacing unit 30A also outputs a mechanical control signal (control) for the driving unit 10 for causing the system controller 18 to execute pre-set operations, such as loading, tape transportation (tape travel) or rotation of the head drum.

During recording/reproduction of the driving unit 10, the error information or the status information is outputted from the driving unit 10 to the interfacing unit 30A.

The interfacing unit 30A converts the data D_0 to D_7 supplied thereto from the host computer 60, to the data configuration of the above-mentioned ultra-small-sized tape cassette and sends the resulting data to the driving unit 10. The drive unit 10 supplies the data supplied thereto through the recording/reproducing circuit 16 to a head of the head drum 15 for magnetically recording the data on the tape 2.

This records the computer use data on the tape cassette 1 as shown in Fig. 2a so as to be used as e.g., data backup.

An identification code as later explained is appended in the control signal CTL as the control information in order to permit data recorded on the tape 2 to be identified on reproduction to be the computer use data.

If it is desired to read data recorded on the tape cassette 1 into the host computer 60, the interfacing unit 30A controls not only transmission and reception of control signals between it and the host computer 60 but also the playback operation in the driving unit 10.

That is, the interfacing unit 30A outputs the mechanical control signal (control) to the driving unit 10 in order to cause the system controller 18 to exe-

cute pre-set operations such as loading, tape travel or rotation of the head drum, for executing the playback operation. The interfacing unit 30A also receives the playback data (data) and the error information (error) and converts the playback data into data of the computer interface configuration (D_0 to D_7) which is outputted to the host computer 60.

This causes the data recorded on the tape cassette 1 to be fetched into the host computer 60.

Fig. 5 is a system block diagram in case the connected interfacing unit is the interfacing unit 30B. In this case, the host computer 60 as an external equipment is an equipment of the SCSI system. The conversion control unit 34B exchanges data and control signals with the host computer 60 through the connector 32B in accordance with the SCSI system. An interfacing similar to that of Fig. 4 is established between the conversion controlling unit 34B and the driving unit 10.

In this case, data from the host computer 60 of the SCSI system can be recorded by the drive unit 10 on the tape cassette 1 by the interfacing operation performed by the conversion control unit 34B; while data reproduced from the tape cassette 1 can be supplied to the host computer 60.

Fig. 6 is a system block diagram in case the connected interfacing unit is the interfacing unit 30C.

In this case, the host computer 60 as an external equipment is an equipment of the PCMCIA system. The conversion control unit 34C exchanges data and control signals with the host computer 60 through the connector 32C in accordance with the SCSI system. An interfacing similar to that of Fig. 4 is established between the conversion controlling unit 34C and the driving unit 10, as in the case of Figs. 4 or 5.

In this case, data from the host computer 60 of the PCMCIA system can be recorded by the drive unit 10 on the tape cassette 1 by the interfacing operation performed by the conversion control unit 34B, while data reproduced from the tape cassette 1 can be supplied to the host computer 60.

That is, with the embodiment illustrated, the computer use data can be recorded on or reproduced from the tape cassette 1 with the aid of the drive unit 10 by interchanging the interfacing units to be in use depending upon the interfacing configuration of a variety of external information equipments. On the other hand, data recorded on the tape cassette 1 are all of the format for recording on the above-mentioned ultra-small-sized tape cassette, and are converted into pre-set interfacing configuration by one of the interfacing units 30A to 30C, so that the data recorded on the tape can be read into a variety of external information equipments.

The interfacing unit 30 may be of any interfacing configuration other than the above-mentioned three interfacing configurations.

Meanwhile, when computer data is recorded on the tape 2 of the tape cassette 1, the control information for enabling the computer data to be discriminated to be computer data instead of being the audio data at the time of reproduction is appended to the computer data. This will now be explained.

The recording format on the tape cassette 1 is as shown in Figs. 7a and 7b. As shown in Fig. 7a, there are formed tracks on the sides A and B in accordance with the helical scan system. Each track is constructed as shown in Fig. 7b.

Each track is made up of 108 blocks, each block being made up of 288 bits.

An inner double recording field is arrayed in the 4th block up to the 12th block, totalling 9 blocks, while an outer double recording field is provided in seven of the last 12 blocks. The recording current is turned on and off during the recording in these double recording blocks. The 92 blocks between these fields represent a recording field.

In the recording field, there are provided two 40-block data areas, two 4-block CTL areas and two 1-block inter-block gap (IBG) areas. Of these, the center two blocks represent an auxiliary area for recording the subcode.

The data area is an area for recording actual audio or data. Control data for these data are recorded as the control information in the CTL area.

By the control information recorded in the CTL area, the sorts of data recorded, such as audio data, computer data, audio data or video data by the second embodiment as later explained, can be discriminated during reproduction.

Fig. 8 shows the construction of one block of the CTL area. This 1-block data is recorded four times in the 4-block CTL area. Since there are two CTL areas in each track, the same CTL data is recorded eight times per track.

Referring to Fig. 8, 11-bit synchronization signals and 13-bit address signals are first arrayed in the CTL block. Then, control words CW_0 to CW_{19}, each being 12 bit words, are recorded. Finally, the CRCC codes (12 bits x 2) are recorded. Of the control words CW_0 to CW_{19}, which are a variety of recorded information data for a track T under consideration, the control words CW_4 to CW_{17} are undefined. Consequently, the control word CW_4, for example, may be used for recording data sort discrimination code. Thus it is possible for the interfacing unit 30 to discriminate sorts of actually reproduced data based upon the CTL data supplied thereto as the playback data during reproduction.

The control word CW_0 may also be utilized.

The control word CW_0 has its recording contents set by so-called paging based upon tracks, as shown in Fig. 9. Each page is incremented by each track and is defined as being turned with a period equal to 2^n. The data shown in Fig. 9 are recorded in each page. If the 4-bit information, recorded as the mode ID, is

"0001", the definition is made that 2-channel audio data has been recorded in the track. It suffices if the definition is made so that, with the use of these four bits, a certain value represents computer data.

By enabling data sorts to be discriminated by the CTL data, it is possible for the interfacing unit 30 to carry out processing so that, when playback data is taken from the drive unit, only the computer data is supplied to the host computer.

A second embodiment of the present invention is now explained. The present second embodiment is the same as the previous embodiment as to the interfacing with the host computer 60. However, it is additionally possible for the interfacing unit 30 to exchange audio or video data with external audio or video equipments. In the case of a tape cassette 1, a variety of data, such as audio data, video data, including still and moving pictures, and computer data, are recorded in a mixed state, as shown in Fig. 20.

As the interfacing unit 30, the following configuration is added to the components similar to those of the first embodiment, as long as the appearance is concerned, as shown in Fig. 10.

A reference numeral 35 denotes an audio (speech) output volume knob. A reference numeral 36 indicates an audio input terminal through which a microphone, for example, is connected and audio signals from the microphone is entered. A reference numeral 37 denotes an audio output terminal operating as, for example, a headphone terminal to which the playback audio signal from the tape cassette 1 is outputted. A reference numeral 38 denotes a video input terminal to which moving and still video signals from a video signal source are entered. A reference numeral 39 indicates a video output terminal to which is connected e.g., a monitoring device for displaying moving or still pictures reproduced from the tape cassette 1.

Fig. 11 is a system block diagram showing a case in which the interfacing unit connected is the interfacing unit 30A associated with the host computer 60 of the parallel interfacing system.

In addition to the components shown in Fig. 4, the interfacing unit 30A includes an audio encoder/decoder unit 40 and a video encoder/decoder unit 41, as shown in Fig. 11. There is also provided a sound volume adjustment unit 35a actuated by the audio output volume knob 35.

The audio signal entered at the audio input terminal 36 is converted by the audio encoder/decoder unit 40 into digital data and encoded into data configuration adapted to the format explained in connection with Figs. 7a to 9 so as to be supplied to a conversion control unit 34A. The audio signal is then supplied from the conversion control unit 34A to the driving unit 10 so as to be recorded on the tape cassette 1.

The audio data reproduced from the tape cassette 1 is supplied from the conversion control unit 34A to the audio encoder/decoder unit 40 so as to be processed with decoding, conversion to analog signals and amplification. The audio data is then outputted through the sound volume adjustment unit 35 at the audio output terminal 37.

The video signals entered at the video input terminal 38 are encoded by the video encoder/decoder unit 41 into data configuration adapted to the NT format as the above-mentioned tape format before being supplied to the conversion control unit 34A. The video signals are then supplied from the conversion control unit 34A to the drive unit 10 so as to be recorded on the tape cassette 1.

The video data reproduced from the tape cassette 1 is supplied from the conversion control unit 34A to the video encoder/decoder unit 41 for decoding before being outputted at the video output terminal 39.

When sending recording data to the driving unit 10, the conversion control unit 34A appends discrimination data in accordance with the above-described system as CTL data to be included in the recording data. That is, the control unit 34A causes a code specifying if the recording data is the computer data, audio data or video data (still or moving video data) to be recorded as e.g., the control word CW_4 of the CTL block.

Thus, even if various data exist in a commingled state on the tape cassette 1, as shown in Fig. 2b, it is possible for the interfacing unit 30 to perform appropriate processing at the time of reproduction. That is, if the CTL data specifies that playback data reproduced during reproduction is computer data, the interfacing unit 30 transmits the data by parallel port interface to the host computer 60. If the CTL data indicates that the playback data is the audio data, the interfacing unit 30 transmits the data to the audio encoder/decoder unit 40. If the CTL data indicates that the playback data is the video data, the interfacing unit 30 transmits the data to the video encoder/decoder unit 41.

Figs. 12 and 13 shows the configuration in which the interfacing unit connected is the interfacing unit 30B conforming to the SCSI system and the interfacing unit 30C conforming to the PCMCIA interfacing system, respectively. The audio input/output or the video input/output are similar to those shown in Fig. 11 and hence the description is not made for simplicity.

Thus, in the present embodiment, the tape cassette 1 may be employed for data backup for information equipments, as in the case of the first embodiment, while the tape cassette 1 may be employed as a multi-media communication medium capable of accommodating a wide variety of data, such as computer data, audio data or video data.

In the present second embodiment, the transfer rate of 85 kbytes/second of the recording format employing the tape cassette 1 is insufficient for recording and/or reproduction of moving pictures of the vid-

eo signals. Thus it is preferred to use the signal compression/expansion system adopted in MPEG-2 or LPEG in the video encoder/decoder unit 41.

If it is desired to further improve the picture quality of the moving picture, it may be contemplated to raise the data transfer rate at the stage of recording or reproducing data on or from a tape of the tape cassette 1. It may thus be envisaged to use a doubled number of revolutions of the head drum.

In the above-described embodiments, the drive unit 10 is configured to be connected to the interfacing unit 30. However, the drive unit may be equipped with an actuating unit, a power source or the like and employed as an independent unit.

Various changes may naturally be made of the construction of various component parts, such as the driving unit 10 or the interfacing unit 30.

Next, a data backup device and a data backup system according to a third embodiment of the present invention will be explained in detail.

The data backup system according to the third embodiment is made up of a host system 110 and a data backup device 120, as shown in Fig. 14.

The host system 110 may be a portable information communication equipment or a lap-top type personal computer equipped with an operating system (OS) having a PC card control function by the PC card control software conforming to PCMCIA/JEIDA standard design statements. There is provided a PC card slot 111 for insertion of a PC card. The host system 110 includes a main body 110a and a cover 110c rotatably mounted with respect to the main body 110a. The main body 110a is rectangular-shaped and has on its one surface a plurality of actuating keys 110b while having on its lateral surface the above-mentioned PC cad slot 111. A display 110d composed of e.g., liquid crystal display elements, is provided on an inner surface of the cover 110c, that is on the surface thereof facing the actuating keys 110b in the closed state of the actuating keys 110b. The host system 110 is loaded in position by introducing the data backup device 120 into the PC card slot 111, as shown in Fig. 15.

The data backup device 120 includes a PC card unit 121 of the PC card size conforming to the PCMCIA standard design statements and a cassette deck unit 122 unified with the PC card unit 121, as shown in Figs. 16 to 18.

The data backup device 120 has its cassette deck unit 122 protruded from the main body of the host system 110 when the PC card unit 121 is inserted in position into the PC card slot 111 of the host system 110, as shown in Fig. 15. A cassette lid 123 is pivotally mounted at an upper wall section of the cassette deck unit 122 of the data backup device 120. On the front wall section of the data backup device 120 are mounted a light-emitting section 124 for displaying the operating state by its lighted state, and an ejection button 125. On actuation of the ejection button 125, the cassette lid 123 is rotated in a direction of being opened from the device 120 for enabling exchange of tape cassettes.

The data backup device 120 is configured to effect non-tracking recording/reproduction of digital data on or from a magnetic tape of 2.5 mm in tape width accommodated in the tape cassette 1 by a rotary head 14.8 mm in diameter provided in a rotary drum 126. The data backup device 120 has in its PC card unit 121 a digital signal processing circuit (DSP) 127, as a main electric circuit of the recording and reproducing system for non-tracking data processing of digital data, a DRAM 128, a DEC/ENC circuit 129, a recording/reproducing amplifier 130, a motor driving circuit 131 and a control computer 132, as shown in Fig. 19. The PC card unit 121 has a memory 133, such as a flash memory of a non-volatile RAM, an interface for a PC card, constituted by a gate array, an error processing unit (ECC) 135 and a bus handler 136 for the DSP 127. The PC card interface 134 is electrically connected to the host system 110 through a 168-pin connector 137 provided on a short side of the device 120. The driving voltages V_{CC}, V_{PP1} and V_{PP2} are supplied to the data backup device 120 through the pin connector 137.

A device driver for the data backup device 120 is pre-loaded on the memory 133 of the PC card unit 121. The device driver may be re-written depending on the sorts of the host system 110.

The PCMCIA/JEIDA provides, as physical design statements, the card size, connector size, environmental conditions for the card or the connector, while providing, as card attribute information design statements, the memory device information, version information, format information or the configuration information. The PCMCIA/JEIDA also provides, as physical design statements, the pin array, electrical interfacing, memory read/write operation, I/O function or signal timing. The data backup device 120 functions as a device conforming to these PCMCIA/JEIDA standard design statements.

The host system 110 has a PC card controller 112, a computer 113, an operating system (OS) for card/socket service or configuration software, and a hard disk drive (HDD) 115, as shown in Fig. 20. If, with the PC card unit 121 inserted into the PC card slot 111 and with the data backup device 120 loaded in position, the power is turned on, the PC card controller 112 of the host system 110 advises the OS 114 of the effect that the PC card has been inserted into the PC card slot 111. The OS 114 is instructed by the PC card controller 112 to search for the card attribute information and the downloading of the device driver. The PC card controller 112 downloads the device driver from the memory 133 of the PC card controller 112 to the OS 114. Based upon the schedule management present in the downloaded device driver, the OS 114 caus-

es data of the HDD 115 to be periodically transferred to the data backup device 120. The data backup device 120 causes data periodically transferred from the HDD 115 to be recorded on the magnetic tape. This enables periodic backup of the data from the HDD 115 by the data backup device 120.

By providing protrusions 138 on the sidewall sections of the cassette deck unit 122 operating as finger support as shown in Fig. 21, the data backup device 120 can be easily mounted on and dismounted from the host system 110.

The data backup device 120 may also be configured to be dismounted from the host system 110 by a link mechanism, as shown in Fig. 22. That is, actuating arms 149 are provided which may be rotated about pivot 143 as the center of rotation by thrusting the protrusions 141 on the sidewall sections of the cassette deck unit 122 against the force of torsion coil springs 142. By rotational actuation of the actuating arms 144, the casing of the host system 110 is thrust by the foremost parts of the actuating arms 144 for dismounting the data backup device 120 from the host system 110.

With the present second embodiment of the data backup device 120, the cassette lid 123 is pivotally mounted on the upper wall section of the cassette deck unit 122, In addition, the light emitting section 124 indicating the actuated state by light and the ejection button 125 are arranged on the front wall section so that the tape cassette 40 will be mounted horizontally on the cassette deck unit 122. In addition to such construction, the cassette lid 123 may be pivotally mounted on the front wall section of the cassette deck unit 122 and the light-emitting section 124 indicating the actuated state by light and the ejection button 125 may be provided on the upper wall section so that the tape cassette 1 will be vertically loaded on the cassette deck unit 122, as shown in Figs. 23 and 24.

Although the tape cassette accommodating a magnetic tape therein is used as a recording medium in the above-described embodiments, disc-shaped recording medium may also be employed as a recording medium. If the disc-shaped recording medium is used as a recording medium, the information specifying the sorts of data recorded on the recording medium can be recorded in a control area of recording control data for supervising data recorded on the optical recording medium, as in the previously described embodiments.

Various modifications may also be made, in addition to the above-descried embodiments, without departing from the purport of the present invention.

Claims

1. A recording and/or reproducing system comprising:

recording and/or reproducing means for recording and/or reproducing digital data or digital signals on or from a loaded tape-shaped recording medium; and

interfacing means having a first input/output means for exchanging data and/or signals with an external information apparatus and a second input/output means for exchanging data and/or signals with said recording and/or reproducing means, said interfacing means converting data and/or signals supplied from said recording and/or reproducing means through said second input/output means and routing the converted data and/or signals through said first input/output means to the external information apparatus, said recording and/or reproducing means also converting data and/or signals supplied from said external information apparatus through said first input/output means and routing the converted data and/or signals through said second input/output means to the recording and/or reproducing means.

2. A recording and/or reproducing system according to claim 1, wherein said recording and/or reproducing means comprises a first connecting section connected to said interfacing means, and wherein said interfacing means comprises a second connection section detachably connected to said first connecting section.

3. A recording and/or reproducing system according to claim 1 or 2, wherein said recording and/or reproducing means records data specifying the sorts of recorded data along with data converted by said interfacing means when said recorded data is recorded on the tape-shaped recording medium, said recorded data being data supplied through said second input/output means from the external information apparatus and converted by said interfacing means.

4. A recording and/or reproducing system according to claim 3, wherein said interfacing means comprises encoding/decoding means for encoding video information and decoding data supplied through said second input/output means from said recording and/or reproducing means.

5. A recording and/or reproducing system according to claim 3 or 4, wherein said interfacing means comprises encoding/decoding means for encoding audio information and decoding data supplied through said second input/output means from said recording and/or reproducing means.

6. A recording and/or reproducing system according to claim 1, wherein said system further comprises

a casing having a flat-plate-shaped section at one end and a housing section for housing said recording and/or reproducing means, said flat-plate-shaped section having a connecting portion for connection to the external information apparatus.

7. A recording and/or reproducing system according to claim 6, wherein said interfacing means is housed in said flat-plate-shaped section of said casing.

8. A recording and/or reproducing system according to claim 6 or 7, wherein a driving power source voltage is supplied to said system through said connecting portion when said system is connected to an external information apparatus.

9. A recording and/or reproducing system according to claim 6, 7 or 8, wherein said interfacing means further comprises a memory having stored therein software for the external information apparatus.

10. A recording and/or reproducing system according to any one of the preceding claims, wherein said recording and/or reproducing means comprises a terminal section through which data is entered to or output; and said interfacing means has a first connecting means for connection to an external information equipment and a second connecting means for connection to said terminal section of said recording and/or reproducing means.

11. A data backup system comprising:

a host system having a slot and having loaded thereon an operating system having a control function for controlling a personal computer card inserted into said slot; and

a recording and/or reproducing system according to any one of the preceding claims, wherein said host system is said external information apparatus and

data backup of said host system is performed by said recording and/or reproducing system when inserted in position in said slot in said host system.

12. A data backup system according to claim 11, when dependent on claim 9, wherein said host system, in use, downloads the stored software from said memory of said recording and/or reproducing system loaded in said slot to an operation system for effecting periodic control operations for data backup in accordance with the stored software.

13. A tape-shaped recording medium in which digital data is recorded during forward transporting of the recording medium in plural azimuth tacks formed in one of two areas divided along the longitudinal direction of the recording medium and in which digital data is recorded during reverse transporting of the recording medium in plural azimuth tacks formed in the other of the two areas, said recording medium comprised of subcode data arrayed at a mid portion of each track, a plurality of control data arrayed on both sides of the subcode data, data areas arrayed on outer sides of said control data, and discrimination data recorded in said control data, said discrimination data specifying the digital data recorded in said data areas.

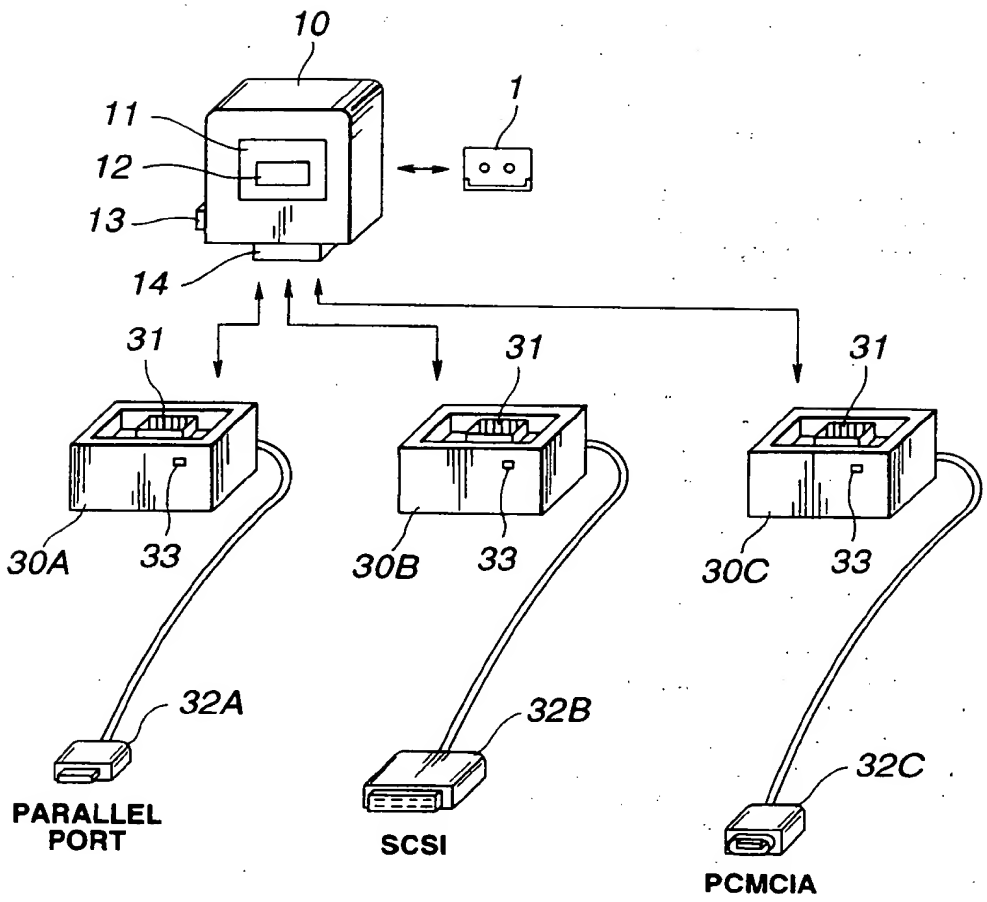
10
11
12
13
14
1
31
31
31
30A
33
30B
33
30C
33
32A
32B
32C
PARALLEL PORT
SCSI
PCMCIA

FIG.1

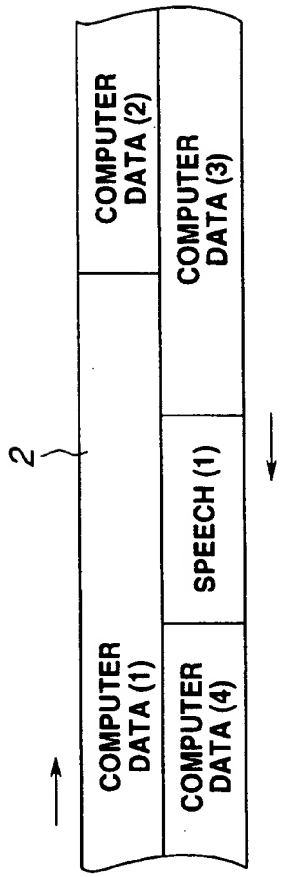
2
COMPUTER DATA (1)
COMPUTER DATA (4)
SPEECH (1)
COMPUTER DATA (3)
COMPUTER DATA (2)
A SIDE
B SIDE

FIG.2(a)

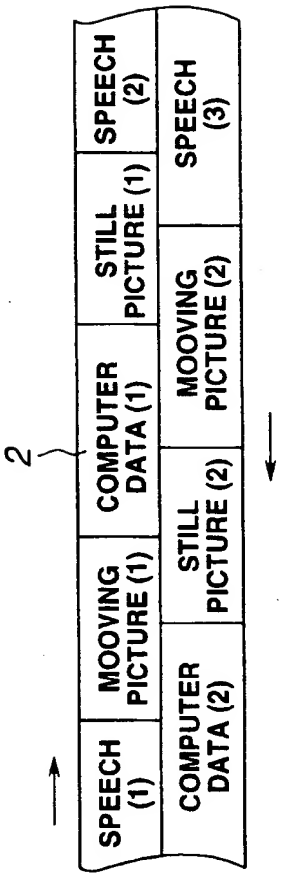
2
SPEECH (1)
COMPUTER DATA (2)
MOOVING PICTURE (1)
STILL PICTURE (2)
COMPUTER DATA (1)
MOOVING PICTURE (2)
STILL PICTURE (1)
SPEECH (2)
SPEECH (3)
A SIDE
B SIDE

FIG.2(b)

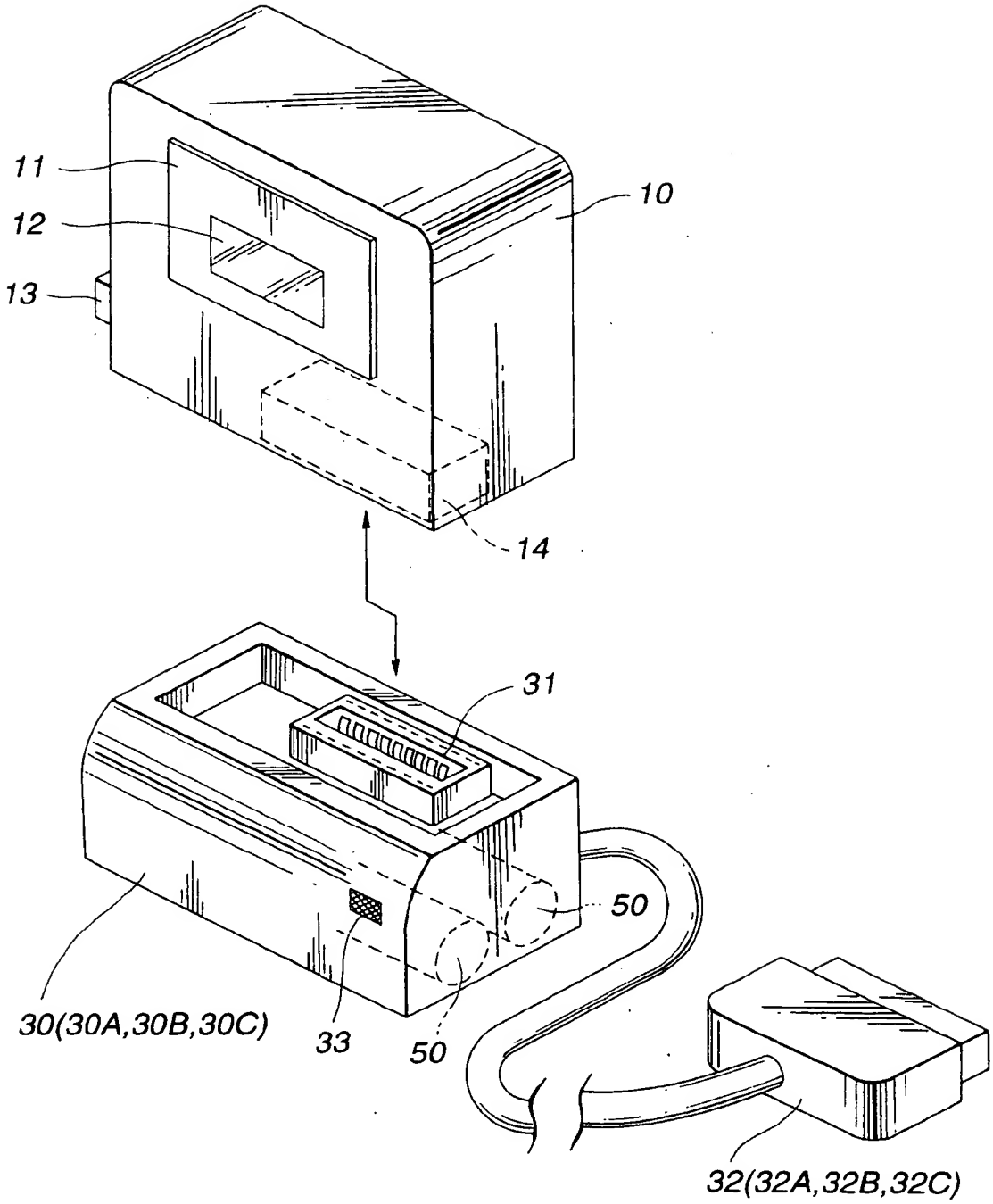

FIG.3

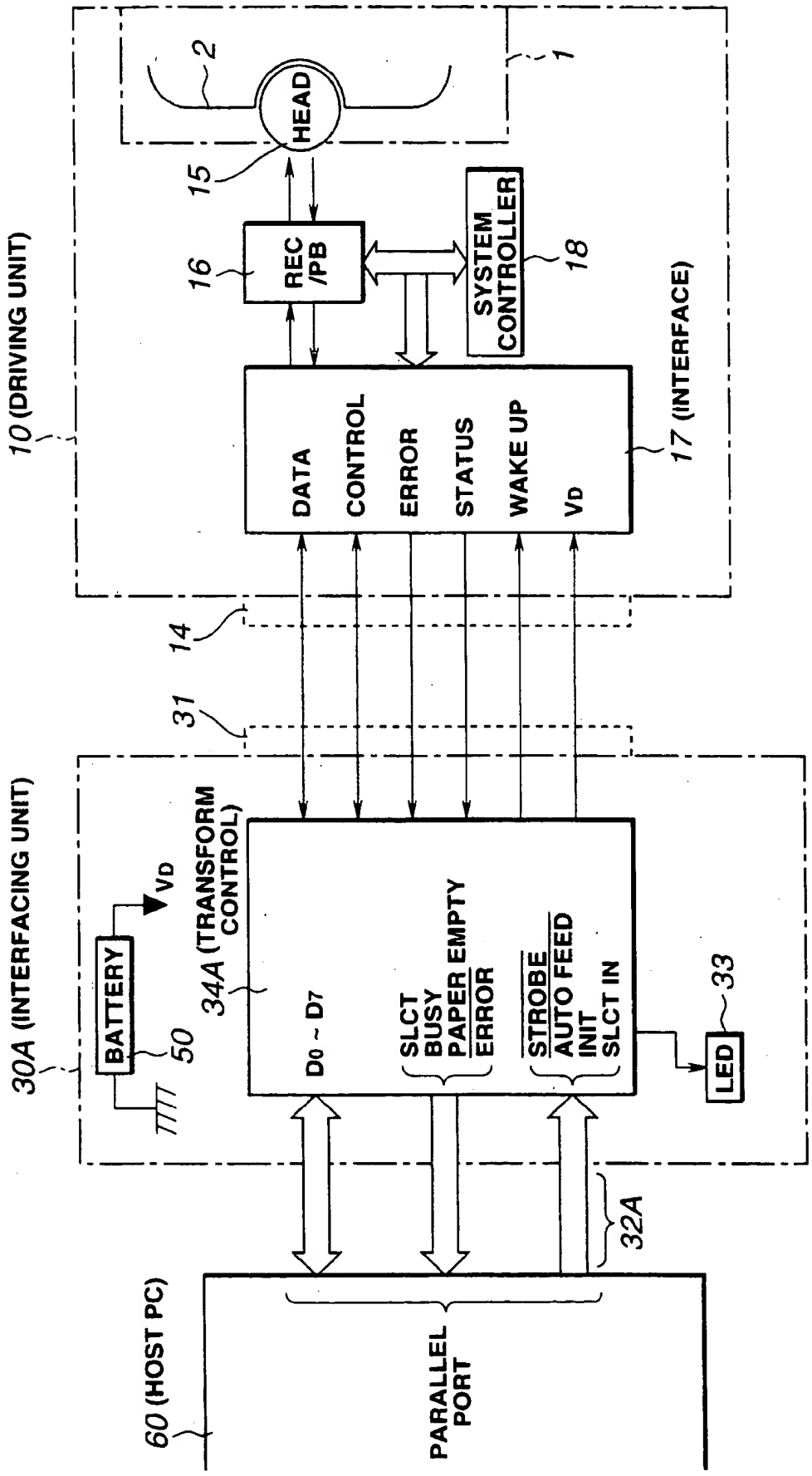
10 (DRIVING UNIT)
1
2
HEAD
15
16
REC /PB
SYSTEM CONTROLLER
18
DATA
CONTROL
ERROR
STATUS
WAKE UP
VD
17 (INTERFACE)
14
31
30A (INTERFACING UNIT)
BATTERY
VD
50
34A (TRANSFORM CONTROL)
D0 ~ D7
SLCT
BUSY
PAPER EMPTY
ERROR
STROBE
AUTO FEED
INIT
SLCT IN
33
LED
32A
60 (HOST PC)
PARALLEL PORT

FIG.4

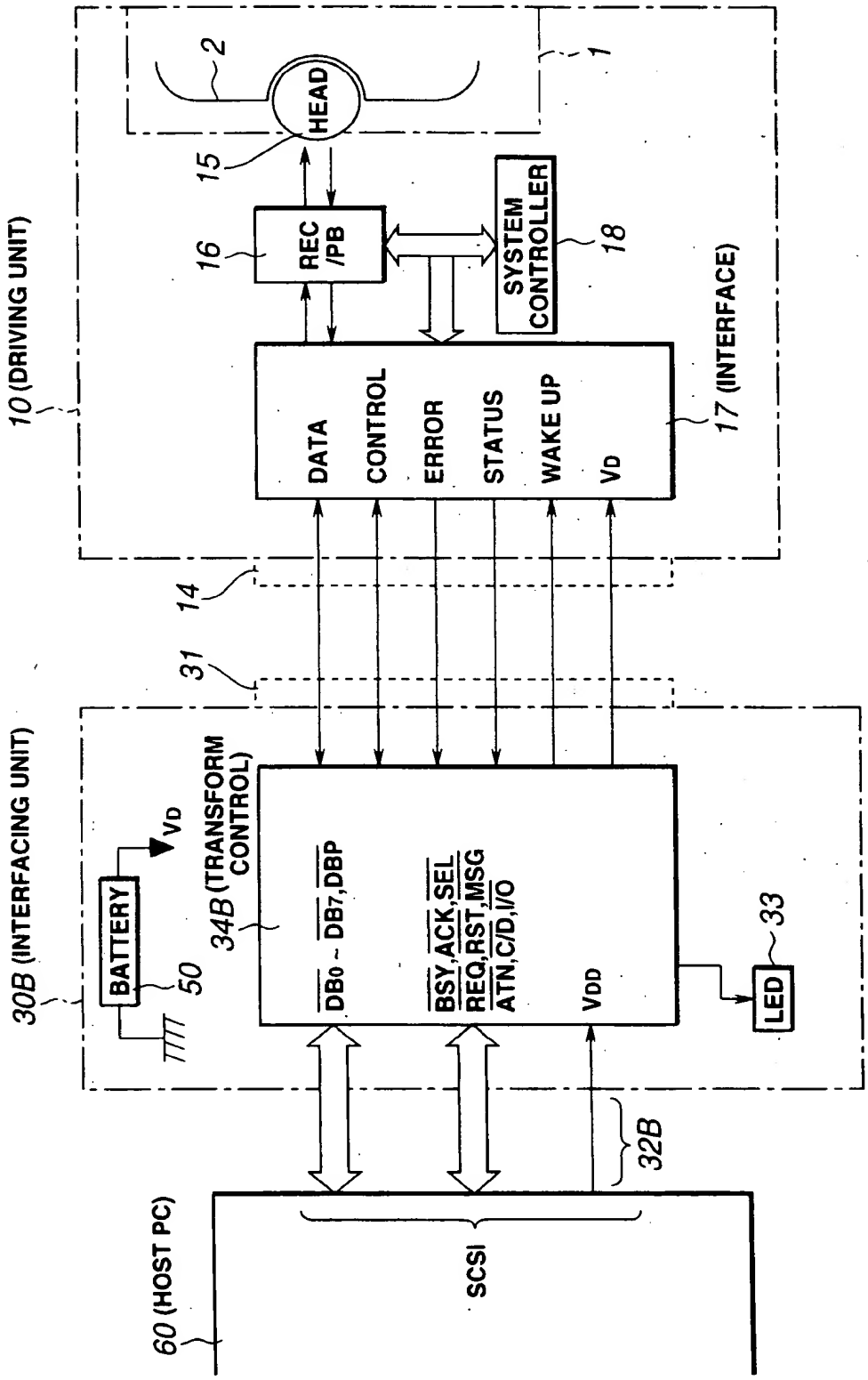
10 (DRIVING UNIT)
1
2
HEAD
15
16
REC /PB
SYSTEM CONTROLLER
18
DATA
CONTROL
ERROR
STATUS
WAKE UP
VD
17 (INTERFACE)
14
31
30B (INTERFACING UNIT)
BATTERY
VD
50
34B (TRANSFORM CONTROL)
DB0 ~ DB7,DBP
BSY,ACK,SEL
REQ,RST,MSG
ATN,C/D,I/O
VDD
LED
33
32B
SCSI
60 (HOST PC)

FIG.5

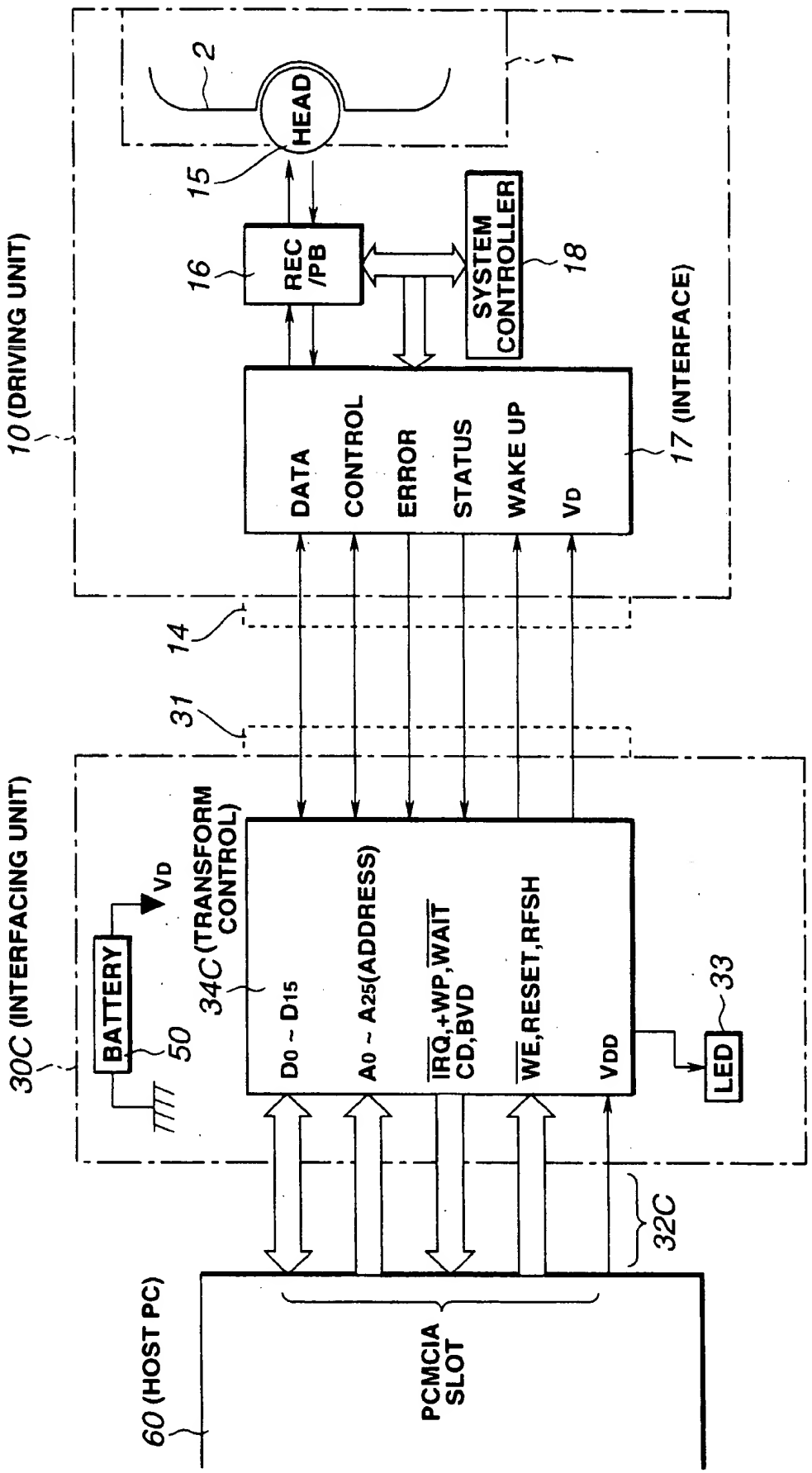
10 (DRIVING UNIT)
2
HEAD
1
15
16
REC /PB
SYSTEM CONTROLLER
18
DATA
CONTROL
ERROR
STATUS
WAKE UP
VD
17 (INTERFACE)
14
31
30C (INTERFACING UNIT)
BATTERY
VD
50
34C (TRANSFORM CONTROL)
D0 ~ D15
A0 ~ A25(ADDRESS)
IRQ,+WP,WAIT
CD,BVD
WE,RESET,RFSH
VDD
LED
33
32C
60 (HOST PC)
PCMCIA SLOT

FIG.6

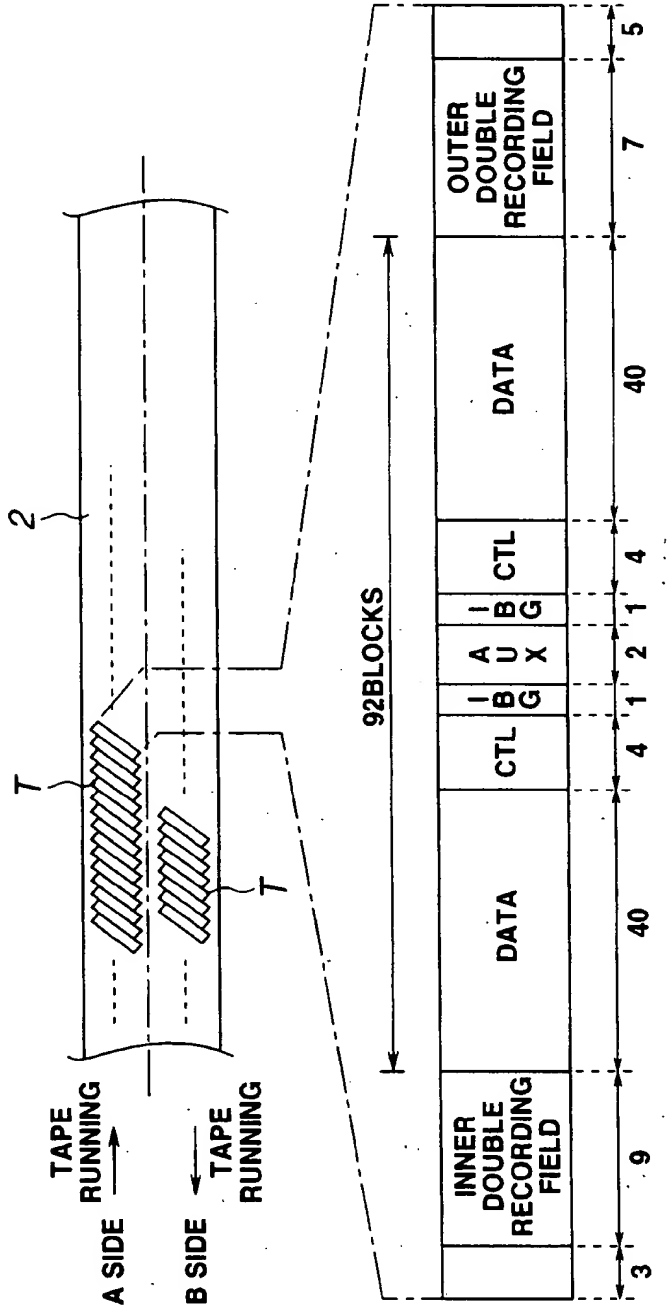
2
T
T
TAPE RUNNING
A SIDE
B SIDE
TAPE RUNNING
92BLOCKS
INNER DOUBLE RECORDING FIELD
DATA
CTL
IBG
AUX
IBG
CTL
DATA
OUTER DOUBLE RECORDING FIELD
3
9
40
4
1
2
1
4
40
7
5
BLOCK
1 TRACK = 108 BLOCKS
1 BLOCK = 288 BITS

FIG.7(a)

FIG.7(b)

CTL AREA

	BIT LENGTH	CONTENTS
SYNC	11	SYNCHRONIZATION
ADDRESS	13	ADDRESS
CW_0	12	FORMAT ID,INTERCHANGEABLE ID,ETC.
CW_1	12	OVERFLOW,LEVEL METER INFORMATION, LEVEL ENVELOPE SIGNALS
CW_2	12	AMS FLAG,AIR TIME DATA BINARY COUNTER
CW_3	12	DATE,TIME INFORMATION
CW_4	12	NOT DEFINED
CW_5	12	
CW_6	12	
CW_7	12	
CW_8	12	
CW_9	12	
CW_{10}	12	
CW_{11}	12	
CW_{12}	12	
CW_{13}	12	
CW_{14}	12	
CW_{15}	12	
CW_{16}	12	
CW_{17}	12	
CW_{18}	12	TEST DATA 0
CW_{19}	12	TEST DATA 1
CRCC	12	CRCC FORMER HALF
CRCC	12	CRCC LATTER HALF

FIG.8

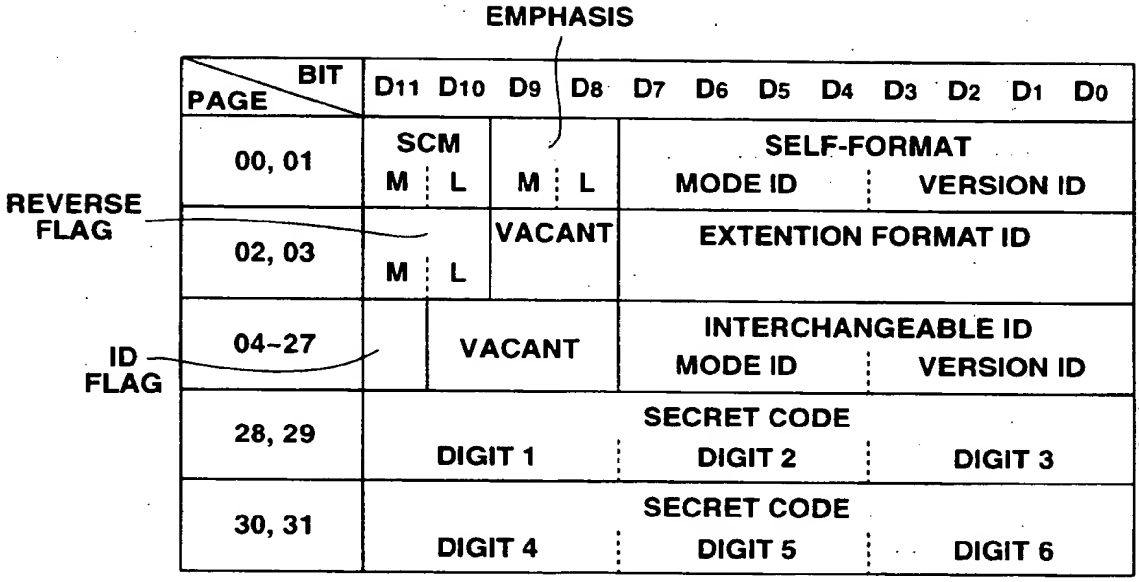
EMPHASIS
REVERSE FLAG
ID FLAG
BIT
PAGE
D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0
00, 01
SCM
M L
M L
SELF-FORMAT
MODE ID
VERSION ID
02, 03
M L
VACANT
EXTENTION FORMAT ID
04–27
VACANT
INTERCHANGEABLE ID
MODE ID
VERSION ID
28, 29
SECRET CODE
DIGIT 1
DIGIT 2
DIGIT 3
30, 31
SECRET CODE
DIGIT 4
DIGIT 5
DIGIT 6

FIG.9

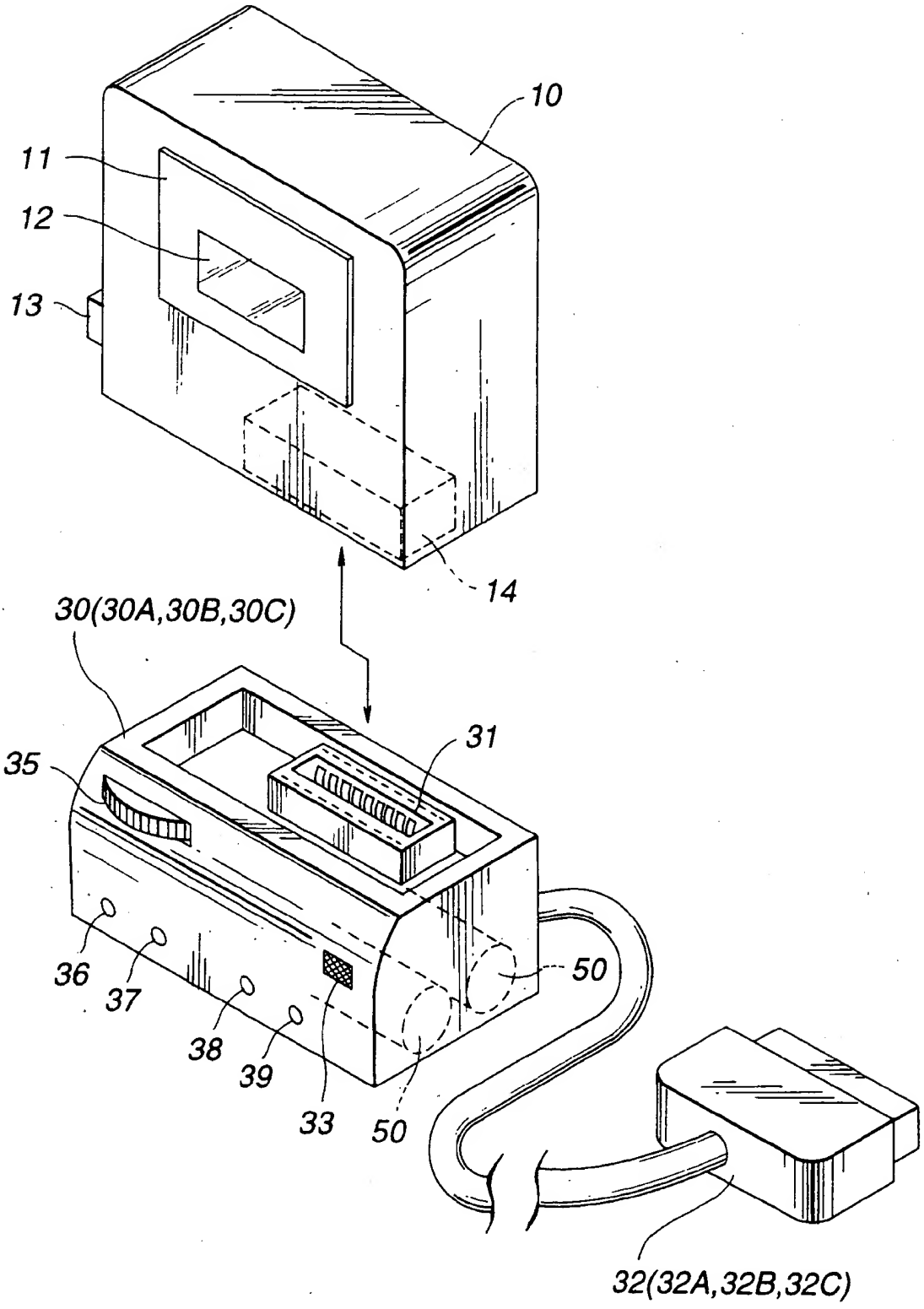
10
11
12
13
14
30(30A,30B,30C)
31
35
36
37
38
39
33
50
50
32(32A,32B,32C)

FIG.10

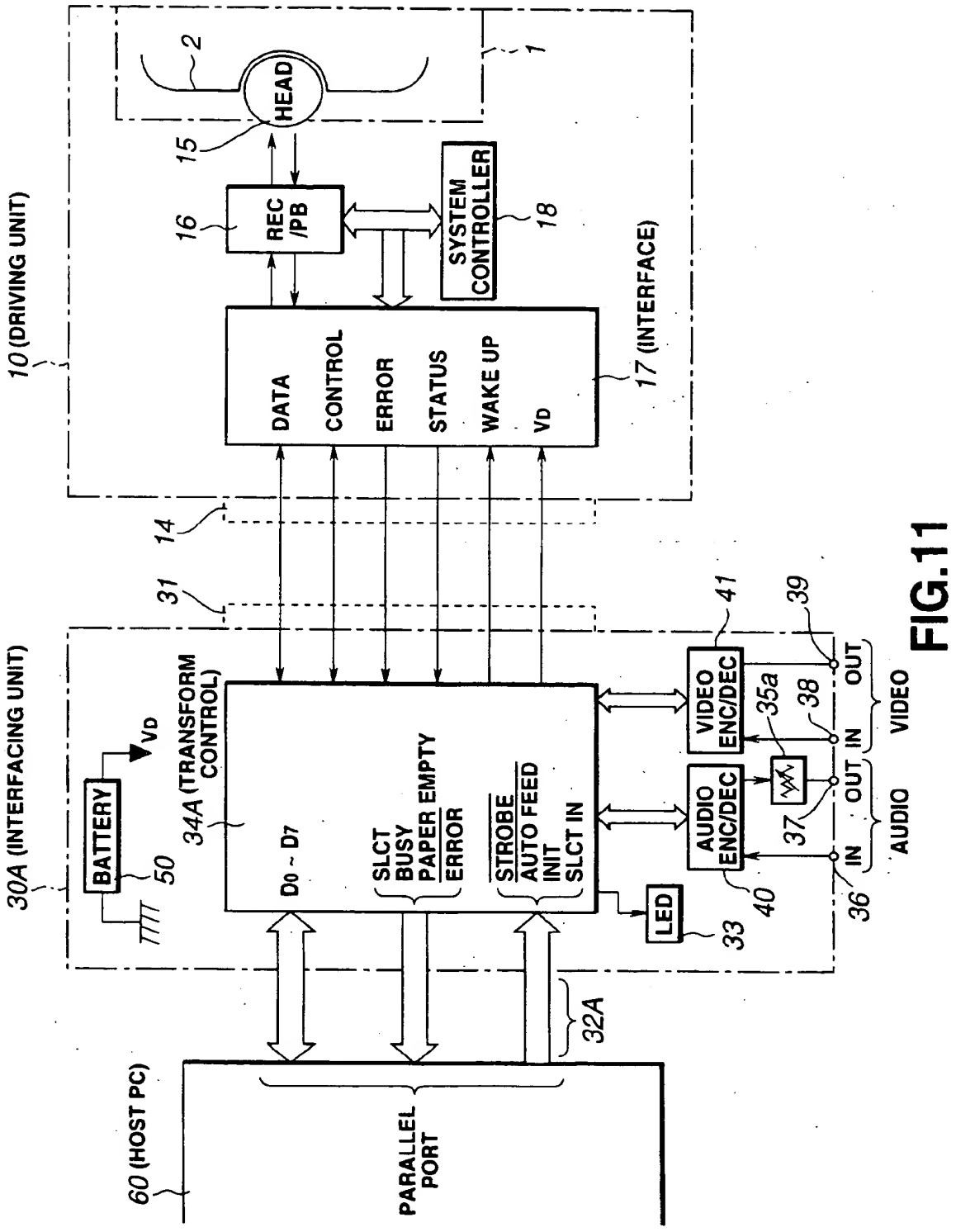
10 (DRIVING UNIT)
2
HEAD
1
15
16
REC /PB
SYSTEM CONTROLLER
18
DATA
CONTROL
ERROR
STATUS
WAKE UP
VD
17 (INTERFACE)
14
31
30A (INTERFACING UNIT)
34A (TRANSFORM CONTROL)
VD
BATTERY
50
D0 ~ D7
SLCT
BUSY
PAPER EMPTY
ERROR
STROBE
AUTO FEED
INIT
SLCT IN
LED
33
VIDEO ENC/DEC
41
AUDIO ENC/DEC
40
35a
37
38
39
IN
OUT
VIDEO
AUDIO
36
32A
60 (HOST PC)
PARALLEL PORT

FIG.11

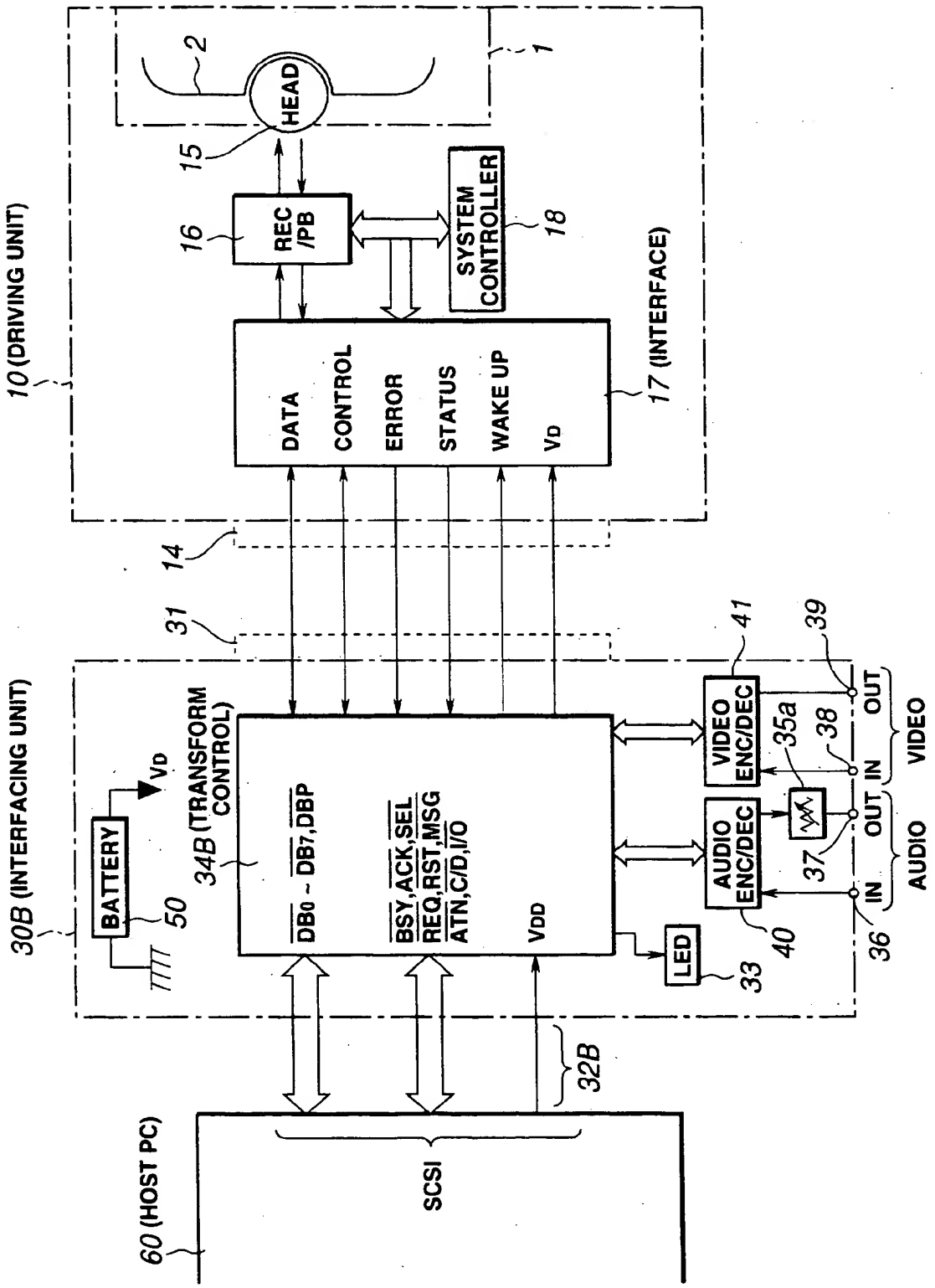
10 (DRIVING UNIT)
2
HEAD
1
15
16
REC /PB
SYSTEM CONTROLLER
18
DATA
CONTROL
ERROR
STATUS
WAKE UP
VD
17 (INTERFACE)
14
31
30B (INTERFACING UNIT)
BATTERY
50
VD
34B (TRANSFORM CONTROL)
DB0 ~ DB7,DBP
BSY,ACK,SEL
REQ,RST,MSG
ATN,C/D,I/O
VDD
LED
33
VIDEO ENC/DEC
41
35a
AUDIO ENC/DEC
40
37
39
38
36
IN
OUT
VIDEO
AUDIO
32B
SCSI
60 (HOST PC)

FIG.12

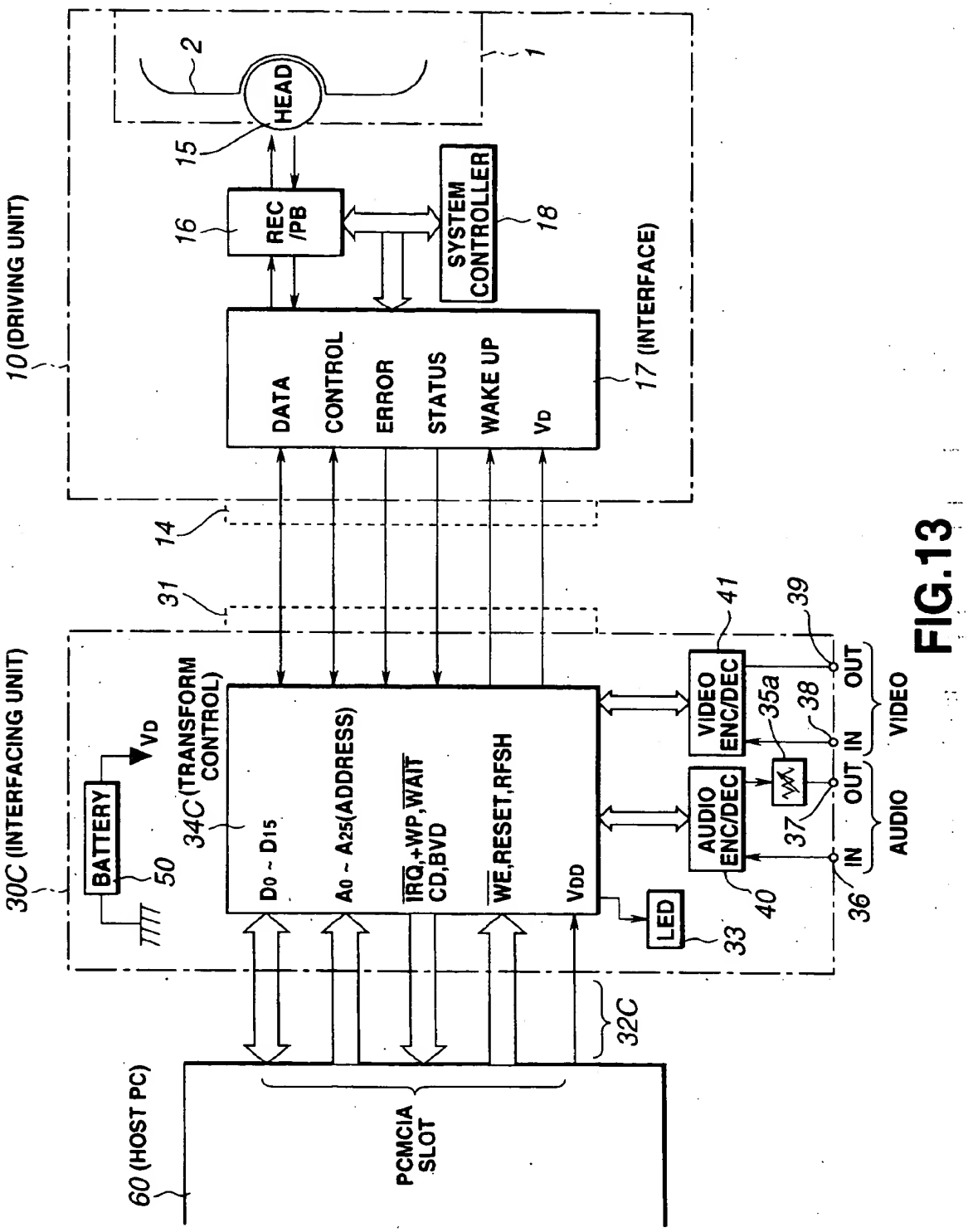
10 (DRIVING UNIT)
2
HEAD
1
15
16
REC /PB
SYSTEM CONTROLLER
18
DATA
CONTROL
ERROR
STATUS
WAKE UP
VD
17 (INTERFACE)
14
31
30C (INTERFACING UNIT)
BATTERY
VD
50
34C (TRANSFORM CONTROL)
D0 ~ D15
A0 ~ A25(ADDRESS)
IRQ,+WP,WAIT
CD,BVD
WE,RESET,RFSH
VDD
LED
33
VIDEO ENC/DEC
41
AUDIO ENC/DEC
40
35a
37
38
39
36
IN
OUT
VIDEO
AUDIO
32C
PCMCIA SLOT
60 (HOST PC)

FIG.13

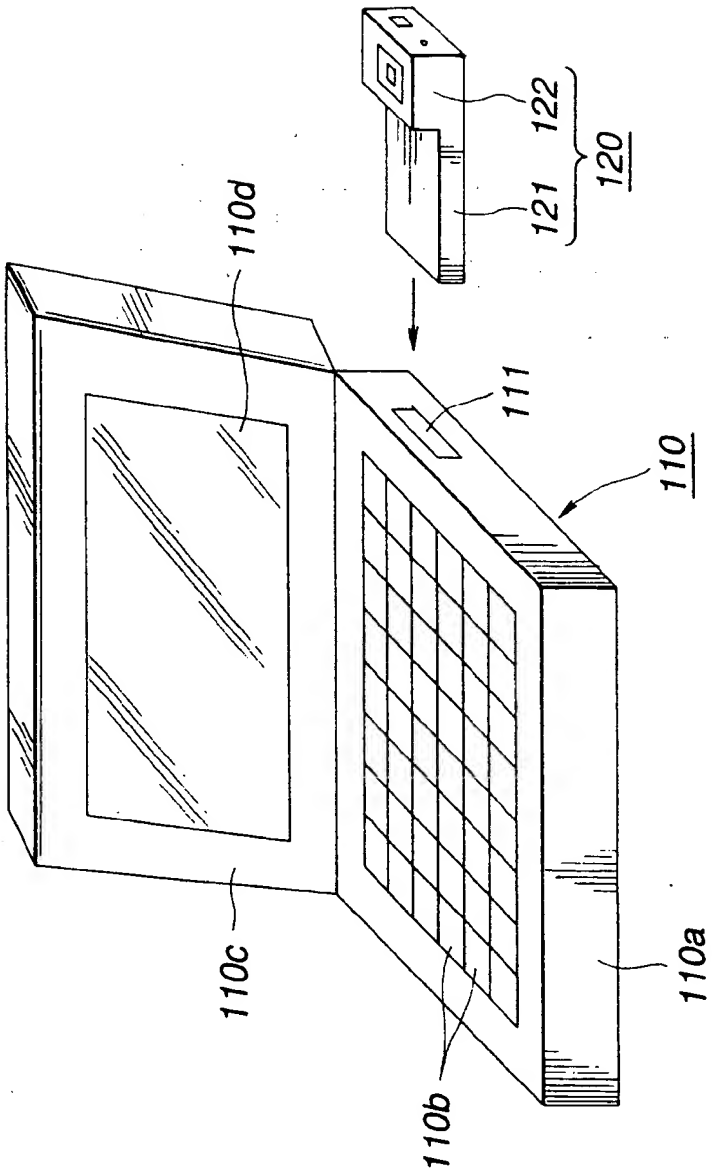

FIG.14

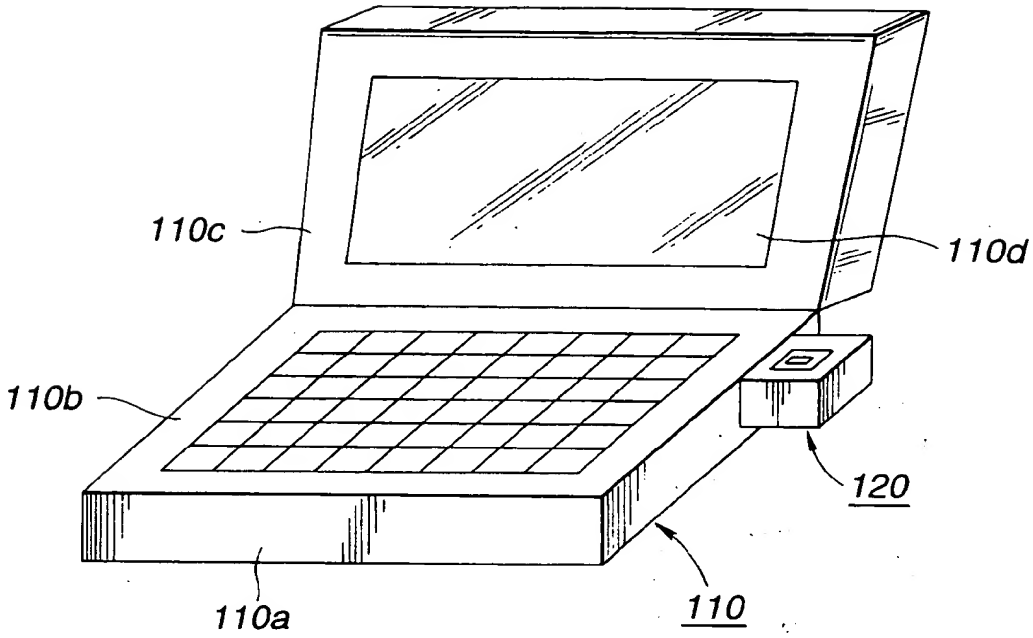

FIG.15

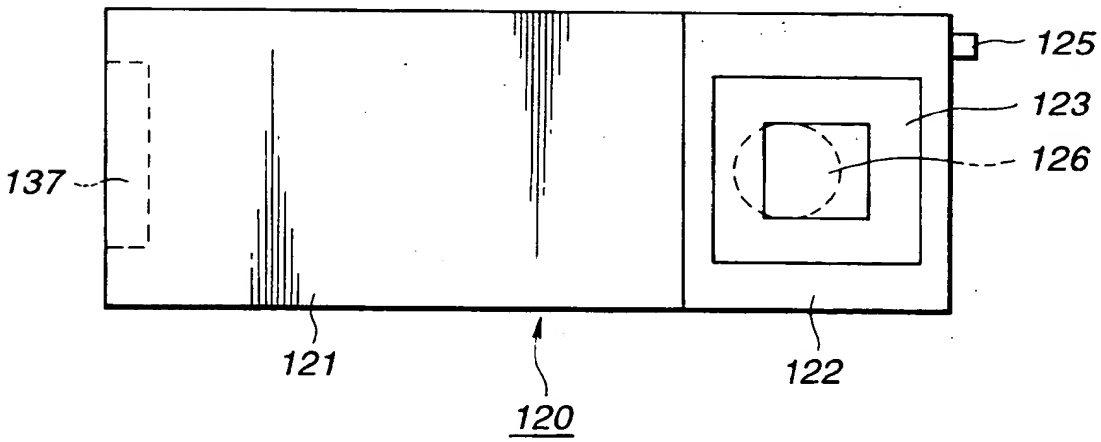

FIG.16

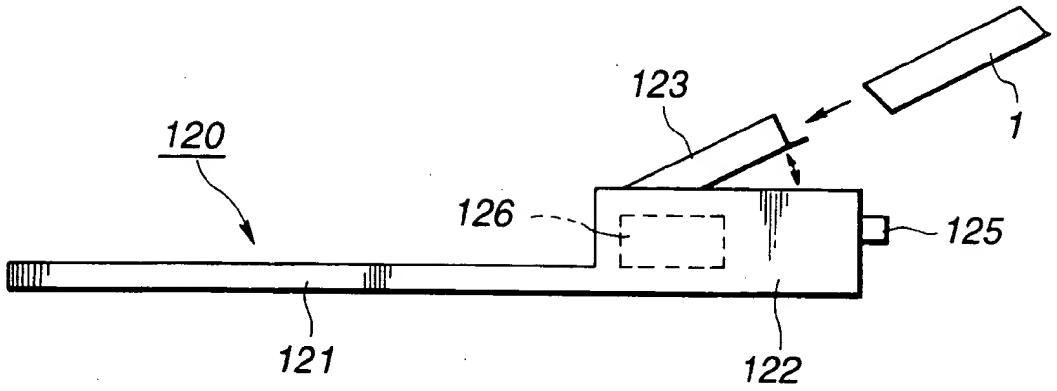

FIG.17

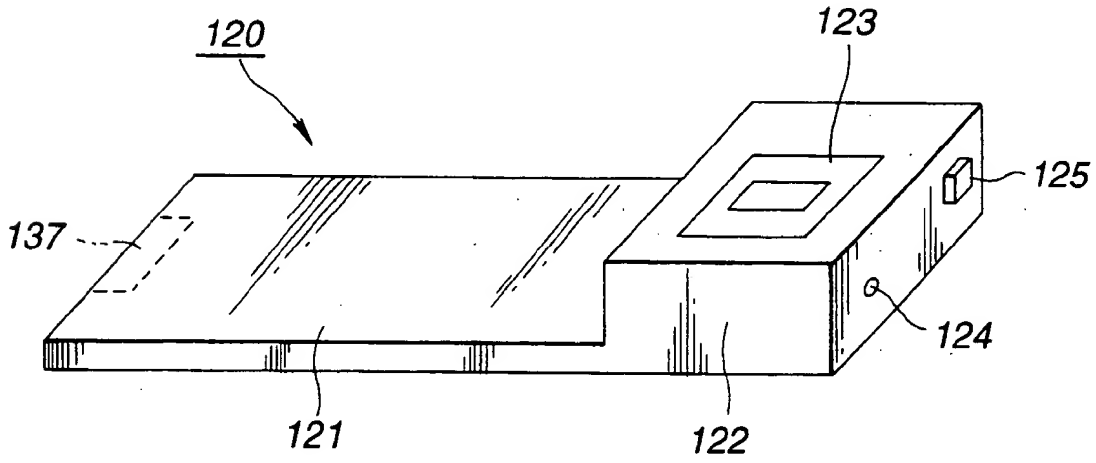

FIG.18

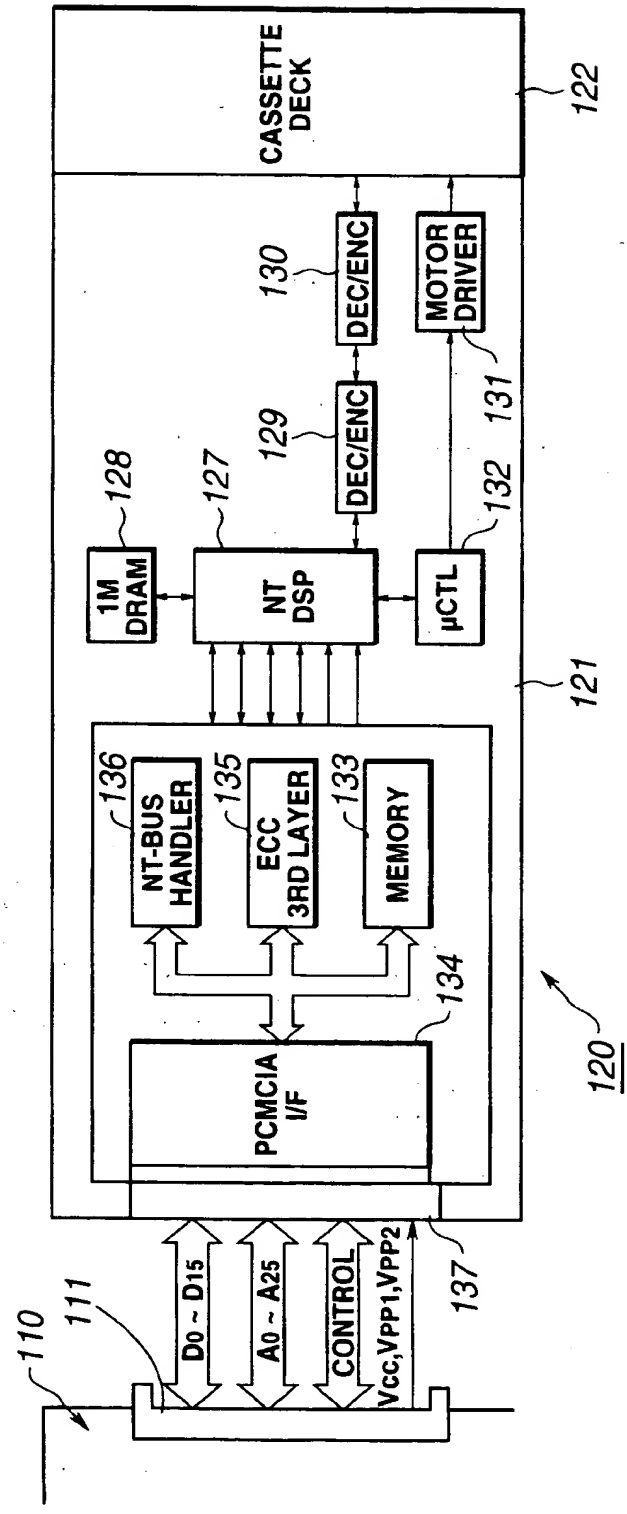
CASSETTE DECK
122
130
DEC/ENC
MOTOR DRIVER
131
129
DEC/ENC
132
128
127
1M DRAM
NT DSP
µCTL
121
136
NT-BUS HANDLER
135
ECC 3RD LAYER
133
MEMORY
134
PCMCIA I/F
120
110
111
D0 ~ D15
A0 ~ A25
CONTROL
VCC,VPP1,VPP2
137

FIG.19

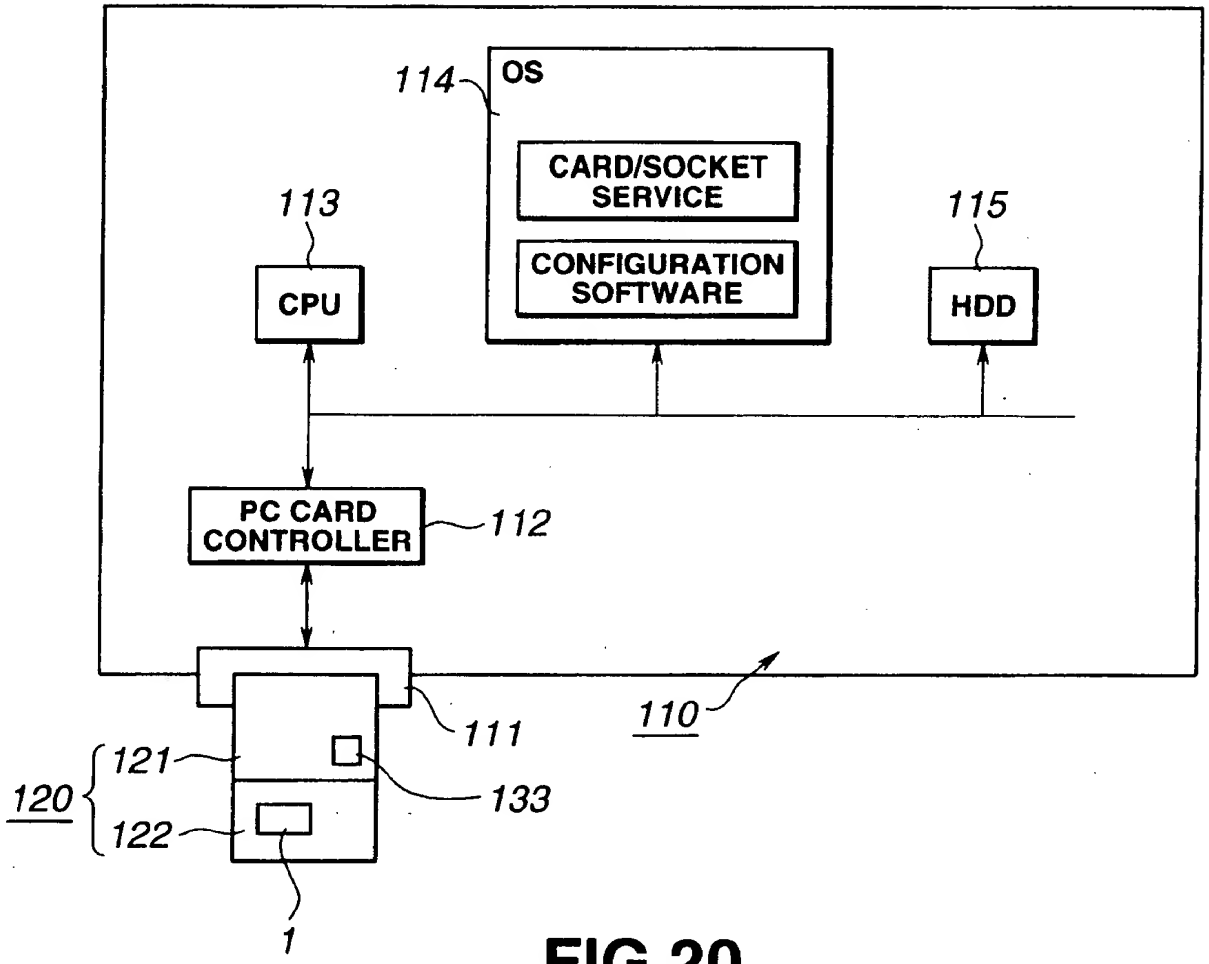
114
OS
CARD/SOCKET SERVICE
CONFIGURATION SOFTWARE
113
CPU
115
HDD
PC CARD CONTROLLER
112
111
110
120
121
122
133
1

FIG.20

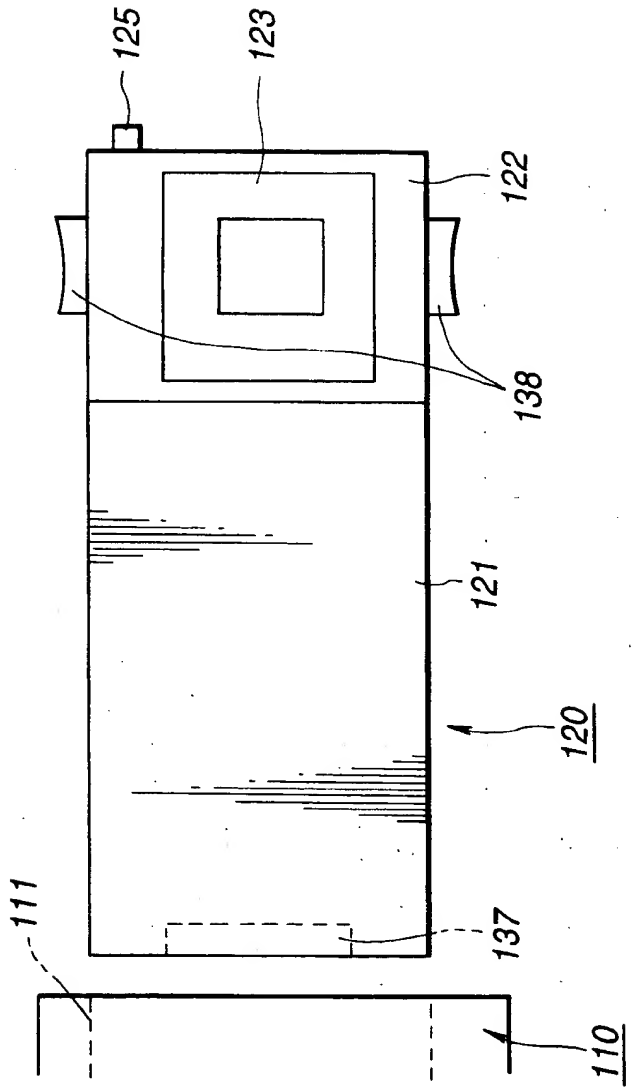

FIG.21

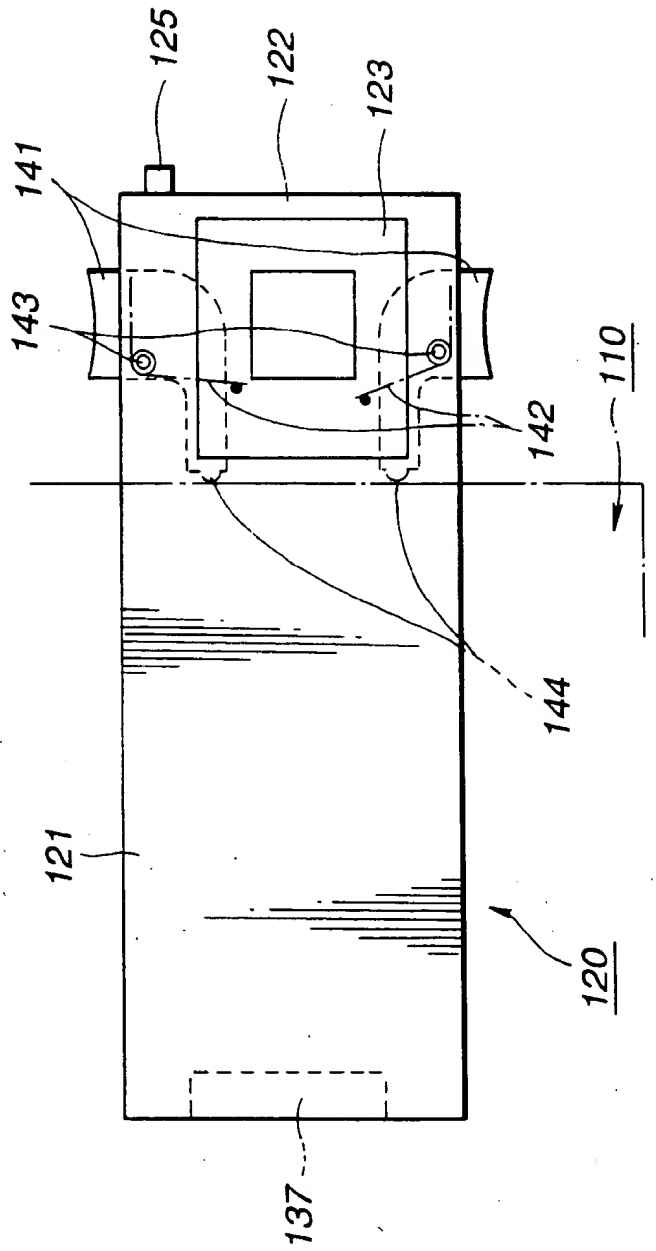

FIG.22

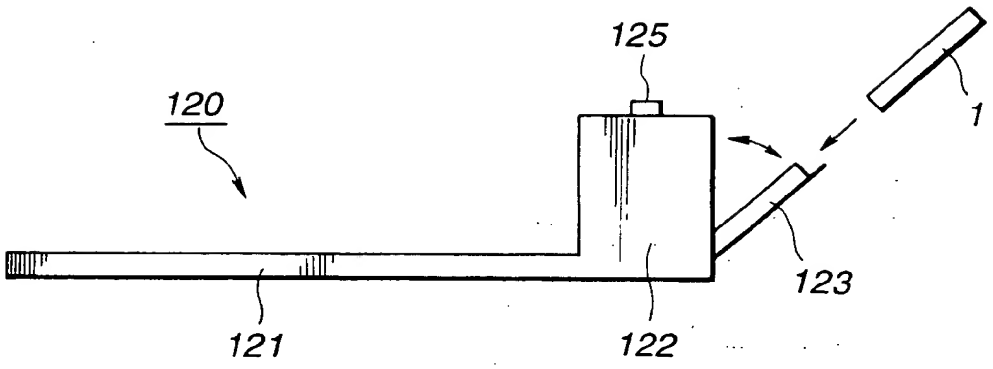

FIG.23

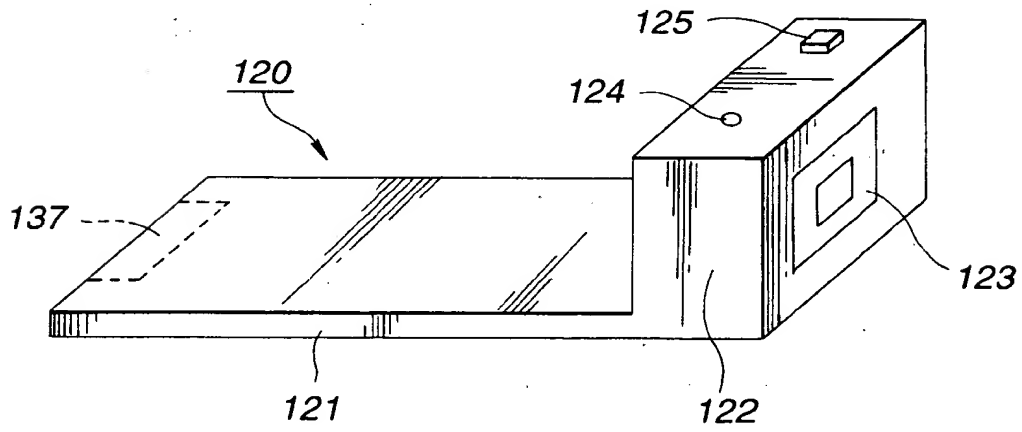

FIG.24

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 30 4244

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X Y	EP-A-0 550 761 (FUJITSU LTD.) * the whole document * * figure 7 * * column 6, line 48 - column 7, line 14 *	1,3 1,2, 4-10,12	G06F3/06
Y	US-A-4 672 481 (ZIEGER ET AL.,) * figure 1 * * column 1, line 37 - line 68 *	1,2,4-10	
X Y	EP-A-0 427 172 (TANDBERG DATA A/S) * figures 1-6 * * column 3, line 41 - column 7, line 36 *	11 12	
Y	ELECTRONICS & WIRELESS WORLD, vol.99, no.1682, SURREY GB pages 51 - 52 'SONY'S NT SYSTEM STORES 2H OF STEREO ON A TINY CASSETTE. BUT WHO NEEDS IT ?' * the whole document *	13	
Y	US-A-5 194 997 (KOZUKI ET AL.,) * figure 3 * * column 4, line 16 - line 61 *	13	TECHNICAL FIELDS SEARCHED (Int.Cl.6) G06F G11B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	29 September 1995	Weiss, P

CATEGORY OF CITED DOCUMENTS

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